

CA1
L56
-66513



MATERIAL HANDLING

Accident Prevention Series No. 13

issued by


**Government Employees Compensation
Branch**

**Department of Labour
Canada**

1962

Hon. Michael Starr
Minister

George V. Haythorne
Deputy Minister



Digitized by the Internet Archive
in 2023 with funding from
University of Toronto

<https://archive.org/details/31761117665422>

*P*rinted and distributed
by the authority vested in the Minister of
Labour under the provisions of paragraph
13 of the "Government Employees Com-
pensation Act", R.S.C. 1952, c. 134 as
amended by R.S.C. 1952, c. 323, 1955, c. 33
which states: "The Minister may promote
and encourage accident prevention activities
and safety programmes among persons
employed in the public service of Canada."

An accident is an unexpected event being caused by one of two things, an unsafe act of a person or an unsafe physical condition, or, perhaps, a combination of both. Accident prevention is the foreseeing of the cause and taking definite steps to eliminate it. Prevent the accident and there will be no injury.

MATERIAL HANDLING

Material handling, in all its many forms, is one of the chief factors in a large percentage of work injuries. All workers in the Public Service of Canada are exposed to this hazard in some form or other from the most junior clerical assistant to the operator of heavy hoisting equipment.

Fortunately, something can be done about these injuries either by the alertness of safety officers removing hazards, relocating processes and other changes or by the workers themselves taking the necessary precautions and using safe job methods.

Modern methods of handling materials have minimized the hazards, but, they do exist wherever men or women work. Safe job methods must always be used to reduce possible injuries.

When handling materials, the following accepted principles should be used as a guide:

1. Arrange work areas so as to avoid back and cross hauling, making possible the hauling of materials in a straight line.
2. Do not attempt to move too much at a time, always keeping within the limitations of the equipment being used.

3. Use suitable equipment; having in mind the type of material to be moved, the volume, the floor capacity and the ceiling height.
4. Handle the material as little as possible. Re-handling increases the hazards.
5. Assess the job; then use the proper equipment and sufficient workers to prevent overexertion.

HOW TO LIFT

The basic preventative measure is in knowing how to perform safely, those activities that might ordinarily cause a straining or stretching of muscles. Muscle strains due to lifting occur when an object is raised incorrectly. The object may even be a comparatively light one, for it is not extraordinary weight alone that causes strain. When an object is lifted improperly, the load placed on the body is poorly distributed and excessive strains are apt to result. The body is so constructed that when the back muscles are called upon to work the abdominal muscles must work as well, therefore, an improper overloading of the back muscles can also strain the abdominal muscles.

The following weights have been generally accepted as within the safe limits for male and female workers required to perform continuous or repetitive lifting:

Male workers —50 pounds in compact form.

Female workers—25 pounds in compact form.

But not even the groups most capable of determining safe load limits for human backs can agree. It would seem that knowledge of how to lift combined with good physical conditions are the keys to the prevention of injuries while lifting.

When lifting, do:—

1. Get a good footing.
2. Place feet about shoulder width apart.
3. Bend at the knees to grasp weight.
4. Keep the back straight.
5. Get a firm hold.
6. Keep the back as upright as possible.
7. Then lift gradually by straightening the legs.
8. When the weight is too heavy or bulky to lift comfortably—get help.

PILING MATERIAL

The size and shape of pile and method of piling will be governed by the material itself, the floor capacity and height of ceiling. Having in mind the need for clear unobstructed passageways, lighting and fire precautions.

The following rules should be observed:

1. Pile materials vertically watching for overbalance.
2. Piles with more than a height of four feet should taper towards the centre above this level.

3. Articles should be cross laid, keeping bag openings towards the centre.
4. When tiering materials, do not lean any stock on the one next to it.
5. Do not overload racks and bins. Distribute the load so that the centre of the storage area does not receive all the weight.
6. Maximum safe pile height for manual piling is seven feet for average loads. However, higher piles can be made if material handling equipment is used.
7. The top of material piles should never, as a general rule, be closer than three feet below sprinkler systems.
8. Pile barrels and kegs on end with planks separating the layers. If they must be stored on their sides, use chocks, racks and separate the rows.
9. Stacks and piles should never rest against walls, the load may cause the wall to collapse.
10. Never exceed the floor load capacities.
11. Never hand lift heavy loads, use mechanical equipment.
12. When more than one person is lifting loads, one man should be in charge and have a workable set of signals. Keep feet and legs from under the material and face in the direction the material is to be moved.

13. Rollers should never be used without crow bars or sledges. Severe injuries can be received if workers attempt to move rollers by hand or foot. Individuals should never attempt to move loads with rollers.

STORAGE

Cardboard cartons, box shooks and wire bound shooks, vary considerably in size and shape setting limitations on the height of piles for stacking purposes. The weight of cartons and containers is another factor to be considered in determining the height to which they can be stacked, because of floor loading limits. Cardboard cartons when dry will not support a heavy load. If they become wet, they will quickly collapse. Sheets of heavy wrapping paper placed between the layer of cartons will help prevent the pile from shifting. Cross tying is to be preferred as it will prevent shifting and sagging and permit stacks to be piled higher.

Acids

Acid carboys are best handled with special equipment, such as carboy trucks. Carboys should not be piled one on top of another. Before employees handle carboy boxes, they should inspect them thoroughly to make sure that the nails have not rusted out and that the wood has not been weakened by acid action. Before being shipped back to the supplier, empty

carboys should be completely drained and the stoppers replaced.

Where caustics or acids are stored, handled, or used, emergency flood showers and eyewash fountains should be available. The men should be provided with chemical goggles, boots, aprons, gloves and other protective clothing necessary to handle any particular liquid.

Explosive solids

Bulk storage of chemicals, grains, and other granular or powdered materials present fire and explosion hazards. Many materials that will not burn in solid form will explode or burn rapidly when finely divided. Some of the more common of these materials are carbon, fertilizers, food products and by-products, metal powders, resins, waxes and soaps, spices, drugs and insecticides, wood, paper, chemical products, hard rubber, sulphur, starch and tobacco. This is by no means a complete list but it does indicate the general categories of explosive dusts.

To avoid dust explosions, formation of an explosive mixture must be prevented or ignition of such mixture must be prevented if its formation cannot be. Either the dust must be kept down or enough air should be supplied to keep the mixture below the explosive limit. Good housekeeping and a good dust-collection system will go far toward preventing disaster.

A person handling a toxic material or other dusty material should wear protective clothing. Such equipment may range from a gas mask to a complete suit of protective clothing.

Handling Explosives

1. Never store blasting caps (fuse type or electric) in the same magazine with other explosives.

2. It is unwise to store dynamite in a powder magazine unless the magazine is explosion-proof, nor to store flammable materials, oil paints, carbide, metal tools, or other material with explosives.

3. Keep fuses in a cool dry place.

4. Never store explosives where children, unauthorized persons or animals can get at them.

5. Keep explosives protected from moisture. Store cases of dynamite top side up so that cartridges lie flat and not on end.

6. Powder kegs may be stored on end but it is best to put the bungs down. When stored on sides, keep the seams down. These practices aid in keeping the powder dry.

7. Use only wooden or fibre mallet and wooden wedge to open packages.

8. Never open or re-cooper packages in a magazine.

9. Never prime cartridges in a magazine.

10. Never take primed cartridges into a magazine or keep them there.

11. Keep all explosives in their containers and covered with lids. Do not let them lie around loose.

12. Destroy empty cases by burning them away from the magazine at a safe place. Never let them get into a stove or firebox. Burn a few at a time.

13. Keep floors clean. Sweepings of dynamite may be spread out on the ground at a safe location and burned by starting with a trail fire. Black powder sweepings should be destroyed with water.

14. Never carry matches or permit matches to be carried at magazines, or on powder trucks, cars or wagons.

15. Use only electric flashlights or electric lanterns.

16. Never smoke or permit anyone else to smoke in or around magazines or on vehicles on which powder is transported.

17. Keep grass, weeds, underbrush and dry leaves away from around magazines to protect against fire.

Flammable Liquids

Only a few ounces of a highly flammable liquid can burn you seriously and, perhaps, fatally.

1. For working quantities of flammable liquids, use only approved safety cans in good condition.

2. Store all flammable liquids in an approved oil house, fireproof room, or fireproof cabinets.

3. See that all tanks, containers, and cans are plainly marked, with contents labeled.

4. Never smoke, use open flames, or strike sparks where flammable liquids are used or stored.

5. Keep all containers not in use tightly closed, and at the end of the shift return them to storage.

6. Never use a container for any liquid other than that for which it is intended.

7. Use a carbon dioxide, foam, dry chemical, or vaporizing liquid pump type extinguisher on flammable liquid (Class B) fires.

Grinding Wheels

Grinding wheels may become broken while in use because of rough handling, improper mounting or improper storage.

Grinding wheels should never be left on a floor or thrown into a pile. If damaged, a wheel should immediately be tested for defects and removed from service if found defective.

Wheels should be tested for soundness before storing and again before being put into service.

Here are good ways to store grinding wheels:

1. Straight or tapered wheels: on edge in racks from which they cannot fall.

2. Thin rubber, shellac or other organic bonded wheels: lay flat on plane surface.

3. Cylinder and large cup wheels: stack on flat sides with corrugated paper or other cushioning material between them.

4. Small cup or other odd-shaped wheels: in boxes, bins, or drawers, preferably with a compartment for each wheel.

5. Very large wheels: in original containers.

Unloading Railroad Cars

When unloading railroad cars there are many ways of getting hurt. Therefore, be alert at all times. Here are a few safe practices to keep in mind.

1. Before unloading a railroad car, be sure that brakes are set, wheels blocked, and “blue” warning flags or lights are properly placed.

2. Always use a “car-mover” to move a railroad car.

3. When opening a box car, first, open the door part way; make sure nothing will fall out; then open it completely.

4. Be sure gang-planks are held firmly in place.

5. Use safety wrenches to open “drop bottom” cars.

6. When the job is completed, remove the blocks and flags or lights. Remember that railroad switchmen are not permitted to remove “blue” flags or lights.

Chlorine Containers

Some handling and storing safe practices are as follows:

1. Handle chlorine containers so that they will not be bumped or dropped. Two men in handling are safer than one.

2. Avoid hoisting containers. Low rubber-tired trucks or jack trucks are preferable.

3. If hoisting is necessary, use safe lifting clamps; ropes are a second choice. Avoid cables or chain slings.

4. Store containers (up to 150 lbs.) vertically; see that they are supported so they cannot fall over.

5. Arrange a storage place where containers will be shielded from any mechanical disturbance, especially moving objects.

6. Storage locations should be free from extremes of temperature. High temperatures are especially dangerous, causing high pressures and increasing possibility of leaks. Keep containers away from hot radiators or hot pipes. When containers are equipped with fusible plugs, bad leaks are likely at temperatures over 160 degrees Fahr.

Compressed Gas Cylinders

Handling compressed gas cylinders is a two-man job.

1. Always consider each cylinder as full, and handle it accordingly.

2. If handling oxygen cylinders with gloves, they should be completely free from oil or grease.

3. Always keep acetylene cylinders on end.

4. When cylinders are being transported, block or tie them securely.

5. Lift, rather than slide, each cylinder from a truck. Avoid bumping the valve-protecting cap.

6. Use a cradle or holder when lifting cylinders with a crane; never use a magnet.

7. Rolling cylinders is dangerous; use a carrier.

8. Never use compressed gas cylinders as rollers for moving heavy material.

9. Store the cylinders securely so that they cannot fall over or be struck, and where they cannot come in contact with salt or corrosive chemicals or fumes.

10. Avoid exposing cylinders to heat or sun and do not place them near flammable materials.

Stores

1. Use ladders for access to bins and shelves that are out of ordinary reach.

2. When you have to move heavy objects, get someone to help you or use a chain-fall.

3. Materials must be stored so that aisles are kept clear at all times and so that access to fire extinguishers is not impeded. Materials must not be piled so that sprinkler heads are prevented from working efficiently.

4. Materials should be piled securely so that they cannot come loose or fall due to vibration.

5. When cutting wire or metal strips from bales or packages, wear goggles and stand where the flying ends cannot strike you.

6. When uncrating material and opening barrels, kegs and boxes, remove all projecting nails before starting to unpack them.

7. Wear gloves when handling cases, crates and metal containers, especially strap or wire-bound boxes or crates.

8. Return all tools to their proper places after you are through with them. Pick up and dispose of boards, covers, empty containers, baling wire, strapping, etc. Maintain good housekeeping at all times.

9. When storing round objects above the floor, place them so that they cannot roll and fall.

10. Do not overfill bins.

11. Safety shoes should be worn by men working in this department.

EQUIPMENT

Modern methods of material handling have developed various types of equipment which have taken the weight off the man but, in doing so, have introduced other hazards. These hazards need not interfere

with the movement of material providing the workers understand the safe use of such equipment.

Hand Truck (Two-Wheeled)

1. A hand truck should be inspected before use. The axles should be greased, the wheels not cracked or broken, and the handles in good condition.
2. Never replace a cotter pin in an axle with a nail.
3. A truck should not be left standing in an aisle nor where it can fall over and obstruct a passageway.
4. Stay behind the truck when going down a ramp.
5. Watch your hands when going through doorways.

Hoisting Apparatus

1. Find out the approximate weight of the load to be lifted and do not overload the equipment. Inspect beam clamps, slings, chain-falls, ropes, etc., before using them.
2. Place the hooks and slings securely, and pad the chain or rope where it bends over a sharp corner.
3. Do not cross a chain, twist it, or put a kink in it. Do not shorten a chain by knotting or bolting.
4. Keep your hands from between cables and pulleys, hooks or slings and the load, or other places where they may be caught when the load is lifted.
5. Keep out from under suspended loads.

Ladders (Straight)

1. Use only ladders in good condition, and use one which is long enough for the job you have to do.

2. Place the ladder on a solid surface. Do not place it on top of boxes or other makeshifts to increase its height.

3. Estimate the length of the ladder and place the feet about one-quarter of that distance from the foot of the surface against which it leans.

4. If the ladder is placed before a doorway, lock the door or have someone guard it. Protect the ladder base from traffic, if necessary.

5. Face the ladder and hold on with both hands while climbing up or down. Clean mud or grease from your shoes before climbing it.

6. When working from a ladder, work facing it, and hold on with one hand.

7. Do not reach out too far from a ladder—climb down and move it so that you can reach the work safely.

8. When leaning a ladder against a vertical pipe, round column, or other curved object, use a ladder with a piece of rope inserted in it in place of the top rung.

9. Ladders with spikes are for use on wooden or dirt floors,—not for cement floors. Do not reverse a

ladder with spikes so that they are on top—get a ladder suitable to the floor on which you wish to place it. Use a ladder with safety feet, or tie both the bottom and the top of the ladder securely before using it.

10. When a ladder is used to reach a platform, the ladder should extend at least 42" above the level of the platform.

11. When carrying a ladder:

- (a) if ladder is light enough for you to handle it alone, carry it with the safety feet to the rear and the front end elevated so it will be above the head of anyone in front of you.
- (b) if the ceiling is low, carry the ladder at your side with safety feet to the rear and grasping it by the rail. Be extra careful when approaching doorways and going around corners.

Ladders (Stepladders)

Most of the rules for the use of straight ladders apply also to stepladders, but these below apply particularly to them.

1. Open the stepladder far enough so that the spreader locks itself in the open position. Do not use stepladders with non-rigid spreaders, such as those made of rope or chain.

2. Do not work from any step higher than the second one from the top. When you come down,

bring your tools with you unless the stepladder is equipped with tool holders.

Wheelbarrows

1. Before using a wheelbarrow, see that the handles are not defective, the wheel is firmly set, and that the legs are solid. The axle bearings should be well oiled.

2. Balance the load and place it well forward in the wheelbarrow. Lift mostly with your legs and keep the back as straight as possible. Do not run while pushing a wheelbarrow, and watch for insufficient clearances at doorways.

3. When transporting a heavy load, plan to get clear of the handles if it should tip over.

4. Check on the solidity of plant runways and platforms across openings.

5. When finished with the wheelbarrow, store it so that it will not tip over in a place where people will run into it.

Cranes and Power Hoists

1. Only those so authorized may operate power hoisting equipment.

2. Test the hoist brakes and controls before starting your shift. If handling an unusually heavy load, test the brakes first by a short lift to see that you have control.

3. Lift a load smoothly, and avoid jerking it into the air. If it does not ride properly, lower it and have the sling readjusted.

4. Take your signals only from the one responsible for giving them. See that everyone is clear and avoid carrying the load over employees' heads. Do not allow anyone to ride on the load or on the hook.

5. Do not attempt to put the hoist trolleys back onto the power line unless the power has been shut off and the switch properly tagged.

Power Trucks

1. Only those so authorized may use power trucks.

2. Stay within rated capacity.

3. Inspect the truck before using; testing the brakes and steering.

4. Start and stop it slowly; do not overload.

5. Put the fork under the center of the weight of the load. Tilt it against the back-rest before moving. Tilt elevated load forward only when directly over the unloading place with load as low as possible.

6. Face the way you are travelling and keep the load just clear of the floor. Back down ramps or inclines to avoid spills and look out for uneven spots in the floor. Do not allow anyone to ride on any part of the truck.

7. Drive at a safe speed and watch out at doorways and intersections. Use your horn, but do not count on it alone—keep your eyes open all the time. Face the direction in which you are moving. Do not carry passengers.

8. Never travel with load elevated.

9. Do not lift load while travelling.

10. Watch out for unstable loads and piles.

11. Keep load against carriage.

12. Check bridge plates into trucks and cars for width—strength—security.

13. Watch rear end swing and overhead clearance.

14. Avoid severe ramming.

15. For better vision, drive backwards with bulky loads but face in direction of travel.

16. Use care in high stacking; watch for falling stock.

17. Report damage or faulty operation.

18. Watch floor strength.

19. Mark power truck route.

20. Lower carriage completely when truck is parked.

21. Keep clear of edge of loading docks.

22. When leaving the truck, shut off the power and remove the switch or control handle.

Motor Vehicles

1. Motor truck drivers shall not allow any employees to ride in the trucks either in the cab or on the body unless in the performance of their work as instructed by their foreman.

2. Truck drivers are absolutely forbidden to give rides in their trucks to any persons, employees or otherwise, either on the premises or during outside trips.

3. No employees shall be allowed to ride on the body of the truck unless absolutely necessary and instructed to do so by the foreman.

4. If necessary for any employees to ride on the body of the truck, they shall not be allowed to stand.

5. Further, if necessary for employees to ride on the body of the truck they shall not do so unless there is positive protection provided both by side boards and tail board or other adequate barrier protection on both sides and rear of the body.

6. Motor trucks on the premises shall proceed in a forward motion rather than in reverse where possible.

7. At all times motor trucks on the premises shall proceed at a very slow speed. Ten miles an hour is a suggested speed limit.

8. Trucks approaching a blind corner or intersection shall come to a full stop and sound a warning before proceeding. Signs should be erected requiring

this, and the practice enforced in particularly bad spots.

9. Trucks shall come to a full stop before proceeding across any railroad crossing.

10. Whenever necessary for any truck to proceed in reverse through any of the roads or approaches to platforms, a lookout shall be posted at the rear of the truck in full view of the driver to give any necessary warning either to the driver himself or any persons who might be in danger.

Elevators

1. The elevator must not be overloaded. Find out its safe capacity if it is not marked in the cab.

2. Before starting the elevator, be sure that all gates or doors are closed and latched and that there is nothing which projects into the shaftway.

3. Face the front of the cab while operating or riding in an elevator.

4. Do not attempt to reverse the motion of an elevator without first bringing it to a full stop, as it places too great a strain on the mechanism.

5. Ring the warning bell, then wait a few seconds before moving the elevator from another floor.

6. Stop the elevator cab flush with the floor.

7. If it is necessary to remove or fold back the cover of the elevator cab in order to handle long materials, the cover must be replaced when the job is finished.

8. When stopping the cab at a floor for loading or unloading of materials, the operating control must be locked while this work is in progress.

9. Do not jump on or off moving elevators.

10. Do not insert your head into the shaftway for the purpose of locating the cab.

11. Close the elevator gates when you are through using it.

12. Do not lift the gate when the elevator is not at your floor.

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1962

Cat. No. L2-19/13